DISCUSSION.

With reference to evaporation, the thing which Prof. Bode measured was essentially the evaporative capacity with reference to the porous cup atmometer and its environment. This is the same thing which has been described by Livingston and others as "the evaporative power of the air."

Evaporative capacity, and the evaporative loss from the soil, may be, and usually are, quite different, the former being the larger, since the latter is the product of the evaporative capacity and a factor termed by the writer "Evaporative Opportunity," and which is approximately proportional to the percentage of saturation of the soil surface, and is generally less than unity.

If, therefore, when Prof. Bode speaks of evaporation, it is assumed that he means "Evaporative Capacity," and not actually evaporation loss from the soil, then his conclusions are undoubtedly correct, and are in accordance with numerous other investigations along the same line.

More experimental work is needed to determine the precise relations of the actual evaporation loss from the soil in woods, sodded fields, and cropped fields. Very likely the actual loss in sodded fields is greater than in most crops or forests. In considering the possible effects of forests as conservators of moisture, other and more important factors than evaporation from the soil must be considered. These include rainfall interception and transpiration.

It is also important to bear in mind that a comparison of forests with a sodded field may lead to conclusions which will not hold as regards the relation of a forest to a cropped field (of corn, for example).

In the forest the sum of the water losses is undoubtedly greater than in the ordinary meadow or pasture with short grass, for in the latter case interception and transpiration are relatively slight, even though the evaporation from the soil is materially greater than in the forest.

As to soil moisture, the author's experiments indicate less moisture in the surface layers in the open than in the forest, but more moisture in the open below 20 inches depth. Can it be fairly assumed that the moisture content in the forest is greater than in the open from these measurements, even though their numerical average does so indicate? If measurements at 4, 5, and 6 feet, or other depths down to the water table or rock had been taken, these would undoubtedly have shown results similar to those at 20 to 36 inches depth, and would have thrown the average of moisture content strongly in favor of the open field. Are not these results precisely what would be expected?

After a shower the moisture of the surface layers of the soil is more rapidly removed by evaporation in the open than in the forest, and the surface layers of the soil become dryer in the open. At greater depths, however, the smaller losses through interception and transpiration and other factors combined indicate that there should be, as was here found, a greater soil moisture below the influence of surface evaporation in the open.

Prof. Bode suggests that the soil in the forests was more open-textured than that in the open. Even a slight difference in this regard might vitiate the conclusions from such experiments. Soil moisture values are expressed as percentages of dry weights. The greater the porosity, therefore, the smaller the *actual volume* of water corresponding to a given dry weight moisture percentage. In other words, a slight excess of moisture percentage might be merely the result of an excess in porosity, without an actually greater water content.

It is unfortunate that this point was not determined, especially as observations along this particular line are very meager. Similar results have recently been published by Dr. Arnold Engler.[1]—*Robert E. Horton.*

TYPHOON IN THE PHILIPPINES.

By José CORONAS, S. J.

[Weather Bureau, Manila, P. I., November, 1920.]

A destructive typhoon visited the Philippines at the beginning of November, causing much damage to property and to the crops in the Visayan Islands, Mindoro, and southeastern Luzon. Several small boats have been reported as either totally wrecked or badly damaged, with a corresponding considerable loss of life.

As no observations have been received as yet from Yap, Western Carolines, it is impossible to ascertain whether the typhoon was formed near that region of the Pacific Ocean or rather near the Philippines.[2] Clear signs of the existence of the typhoon and of its character as dangerous to the Visayas were noticed at Manila Observatory on November 2, and proper warnings sent out one day before the storm struck the easternmost part of the Visayas. The center of the typhoon must have been situated at 2 p. m. of the 2d near 130° longitude E. and 11° latitude N., moving almost due west. Shortly after noon of the 3d the typhoon reached the island of Samar, passing over, or very close to the south of, Borongan (125° 25′ longitude E., 11° 35′ latitude N.), where a barometric minimum as low as 729.52 mm. (gravity correction not applied) was observed at 12.30 p. m. The typhoon inclined slightly to the NW. while moving between Samar and Mindoro, so that at 6 a. m. of the 4th the center was situated near 121° longitude E. and in about 12° latitude N. The fury of the storm was particularly felt in Samar, northern part of Cebu and Negros, Masbate, Romblon, northern Panay, and Mindoro.

Once in the China Sea the typhoon moved again almost due west, and it reached Indochina in the morning of the 6th, the center being situated at 10 a. m. of that day in about 109° longitude E. and 13° latitude N.

The rate of progress of this typhoon while crossing the Philippines was of about 14 or 14.5 per hour.

[1] Influences of Forests on Water Supply, Swiss Central Institute for Forest Investigations, vol. 12. Zurich, 1919.

[2] See reference to report of Dutch S. S. *Bali*, in review of the weather of the North Pacific Ocean for November, p. 667.